



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number:

0 434 652 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **30.11.94** (51) Int. Cl.⁵: **E21B 7/02**

(21) Application number: **90850386.5**

(22) Date of filing: **28.11.90**

(54) **Rock drilling rig.**

(30) Priority: **20.12.89 SE 8904273**

(43) Date of publication of application:
26.06.91 Bulletin 91/26

(45) Publication of the grant of the patent:
30.11.94 Bulletin 94/48

(84) Designated Contracting States:
CH DE FR IT LI SE

(56) References cited:
EP-A- 0 016 717 AU-A- 528 751
BE-A- 527 878 DE-A- 1 805 226
GB-A- 2 103 969 GB-A- 2 119 441
US-A- 3 020 012 US-A- 3 226 064

(73) Proprietor: **Atlas Copco Construction and Mining Technique AB**
Nacka
S-105 23 Stockholm (SE)

(72) Inventor: **Eriksson, Sven**
Vassvägen 3
S-702 31 Örebro (SE)

(74) Representative: **Grundfelt, Erik Gunnar**
Atlas Copco Tunnelling & Mining AB
Patents & Trademarks
S-105 23 Stockholm (SE)

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

Description

The present invention relates to a rock drilling rig and in particular to a rig having an extension boom.

In prior art drill rigs it has been common practice to guide the extension part of the boom such that relative rotation between the two boom parts cannot occur. In applications with rotation of the boom head about the longitudinal axis of the boom one has used a rotary motor at the distal end of the boom. A drawback with such an arrangement is that the weight at the distal end of the boom becomes rather high. As a consequence the boom and the drill rig must be made stronger and heavier than otherwise. Furthermore, the front end becomes quite big if one wants to have further possibilities of manoeuvring the feed beam of the rig relative to the surrounding rock.

According to a prior art drill rig, see EP-A-0016717, the boom comprises two members which have square cross-sections. The second boom member 15b is longitudinally movable relative to the first boom member 15a by means of a hydraulic cylinder 16' in the first boom member. The first boom member is furthermore provided with a rotary motor positioned at about the midpoint of the first boom member 10, 15a for rotation of the front part of the first boom member 15a relative to the rear part 10 of the first boom member. Because of the square cross-sections the second boom member 15b follows the front part of the first boom member in its turning movement.

The present invention, which is defined in the subsequent claims, aims at providing a rock drilling rig with an extension boom where the extension part of the boom is rotatable about the longitudinal axis of the boom by means of a motor positioned at the proximal end of the boom. This gives the advantage of having the weight of the rotary motor near the carrier so that the boom does not have to be heavy in order to be sufficiently stiff. Another advantage is that the rotary motor does not interfere with other manoeuvring means for the feed beam which sometimes are desirable. An important advantage with the invention is that the extension and rotation movement of the boom can be guided in a common bearing arrangement which allows savings of weight and cost. All sensitive bearings for extension and rotation can with this invention be easily sealed off with a simple and reliable circular sealing which will significantly increase service life and decrease maintenance costs of the boom.

An embodiment of the invention is described below with reference to the accompanying drawings in which fig 1 shows a side view of a drill rig according to the invention. Fig 2 shows a part of the drill rig and indicates possibilities of movement

of the feed beam. Fig 3 shows how a rock drilling machine can be moved close to the rock surface. Fig 4 shows a longitudinal section through the boom of the drill rig. Fig 5 is a section according to 5-5 in fig 4.

The rock drilling rig shown in the drawings comprises a carrier 11 on which a first elongated boom member 12 is mounted by means of a universal joint 13. The first boom member is swivable relative to carrier 11 by means of two hydraulic cylinders 32, only one visible in the drawing. A second elongated boom member 14 is guided by the first boom member for longitudinal movement therein. A sliding bearing 28 is placed between the first and second boom members. At the rear or proximal end of first boom member 12 a rotary motor 17 is mounted. The outgoing shaft 19 of the rotary motor is by means of a splined coupling 29 connected with a hydraulic cylinder 18 which can be rotated by means of the rotary motor 17. The external surface of the hydraulic cylinder is provided with a number of longitudinal lands 25 and intervening grooves 26. The second boom member 14 is at its rear end of its internal surface provided with ridges 27 which extend into the grooves 26 of the hydraulic cylinder 18. In this way turning of hydraulic cylinder 18 is transferred to second boom member 14 independent of the position of the second boom member along the hydraulic cylinder. A plastic sheet 30 is positioned over ridges 27 to form a bearing between hydraulic cylinder 18 and second boom member 14. A piston 31 with a piston rod 20, having a longitudinal axis 21, are movable along the hydraulic cylinder 18 by means of hydraulic fluid entered into the hydraulic cylinder on either side of the piston 31. Piston rod 20 is connected with second boom member 14 so that movement of piston 31 causes relative longitudinal movement between the first and second boom members 12, 14.

At the front or distal end of second boom member 14 a boom head 24 comprising a turning motor 22 is mounted. This turning motor makes it possible to turn the boom head about its axis 23 in addition to the movements made possible by the second boom member. A holder 33 for the feed beam 15 is pivotable about a pivot 34 by means of a hydraulic cylinder 35. Feed beam 15 is displaceable in holder 33 by hydraulic cylinder 36. A rock drilling machine 16 is movable along feed beam 15 in a conventional way.

Claims

1. A rock drilling rig comprising a carrier (11), a first elongated boom member (12), a universal joint (13) connecting the rear end of said first boom member to said carrier, a second elon-

gated boom member (14) guided by said first boom member for longitudinal movement relative thereto, a feed beam (15) pivotally connected to said second boom member and a rock drilling machine (16) moveable along said feed beam, a rotary motor (17) in said first boom member (12) for turning said second boom member (14) about its longitudinal axis (21), a hydraulic cylinder (18) connected to an outgoing shaft (19) of said rotary motor, a piston rod (20) of said hydraulic cylinder being connected to said second boom member (14) to cause relative longitudinal movement between said first and second boom members, **characterized** in that said rotary motor (17) is mounted at said rear end of said first boom member (12), that the external surface of said hydraulic cylinder (18) is provided with a number of longitudinal lands (25) and intervening grooves (26) and that the internal surface of said second boom member (14) is provided with ridges (27) for cooperation with said grooves, whereby actuation of said rotary motor causes said second boom member to turn about its longitudinal axis (21) relative to said first boom member (12).

2. A rock drilling rig according to claim 1, **characterized** in that said feed beam (15) is pivotally connected to a boom head (24) being mounted on said second boom member (14) and having an axis (23) being perpendicular to the longitudinal axis (21) of said second boom member (14).
3. A rock drilling rig according to claim 2, **characterized** in that said boom head (24) comprises a turning motor (22) by means of which the boom head is turnable about its axis (23).

Patentansprüche

1. Ein Gesteinsbohrgerät mit einem Träger (11), einem ersten langgestreckten Auslegerelement (12), einem das hintere Ende des ersten Auslegerelementes mit dem Träger verbindenden Kreuzgelenk (13), einem durch das erste Auslegerelement für eine Längsbewegung relativ zu diesem geführten zweiten langgestreckten Auslegerelement (14), einem mit dem zweiten Auslegerelement schwenkbar verbundenen Vorschubbalken (15) und einer entlang dem Vorschubbalken bewegbaren Gesteinsbohrmaschine (16), einem Drehmotor (17) im ersten Auslegerelement (12) zum Drehen des zweiten Auslegerelementes (14) um seine Längsachse (21), einem mit der Austrittswelle (19) des Drehmotors verbundenen Hydraulikzylinder

(18), wobei eine Kolbenstange (20) des Hydraulikzylinders mit dem zweiten Auslegerelement (14) verbunden ist, um relative Längsbewegungen zwischen dem ersten und dem zweiten Auslegerelement zu verursachen, dadurch gekennzeichnet, daß der Drehmotor (17) am hinteren Ende des ersten Auslegerelementes (12) montiert ist, daß die äußere Oberfläche des Hydraulikzylinders (18) mit einer Reihe von Längsstegen (25) und dazwischenliegenden Nuten (26) versehen ist, und daß die Innenfläche des zweiten Auslegerelementes (14) mit Rippen (27) für das Zusammenwirken mit diesen Nuten versehen ist, wodurch eine Aktivierung des Drehmotors ein Drehen des zweiten Auslegerelementes um seine Längsachse (21) relativ zum ersten Auslegerelement (12) verursacht.

2. Ein Gesteinsbohrgerät gemäß Anspruch 1, dadurch gekennzeichnet, daß der Vorschubbalken (15) mit einem Auslegerkopf (24) schwenkbar verbunden ist, welcher am zweiten Auslegerelement (14) montiert ist und eine zur Längsachse (21) des zweiten Auslegerelementes (14) senkrechte Achse (23) besitzt.
3. Ein Gesteinsbohrgerät gemäß Anspruch 2, dadurch gekennzeichnet, daß der Auslegerkopf (24) einen Drehmotor (22) umfaßt, mittels welchem der Auslegerkopf um seine Achse (23) drehbar ist.

Revendications

1. Equipement de forage pour roche comprenant un support (11), un premier élément de mât allongé (12), un joint universel (13) reliant l'extrémité arrière du premier élément de mât au support, un second élément de mât allongé (14) guidé par le premier élément de mât pour se déplacer longitudinalement par rapport à celui-ci, une poutre d'alimentation (15) reliée en pivotement au second élément de mât et à une machine de forage de roche (16) pouvant se déplacer le long de cette poutre d'alimentation, un moteur rotatif (17) monté dans le premier élément de mât (12) pour faire tourner le second élément de mât (14) autour de son axe longitudinal (21), un cylindre hydraulique (18) relié à un arbre de sortie (19) du moteur rotatif, une tige de piston (20) du cylindre hydraulique étant reliée au second élément de mât (14) pour produire un mouvement longitudinal relatif entre le premier élément de mât et le second élément de mât, caractérisé en ce que le moteur rotatif (17) est monté à l'extrémité du premier élément de mât (12), en ce que la

surface extérieure du cylindre hydraulique (18) est munie d'un certain nombre de saillies longitudinales (25) et de rainures intermédiaires (26), et en ce que la surface intérieure du second élément de mât (14) est munie de nervures (27) destinées à coopérer avec les rainures, de sorte que l'actionnement du moteur rotatif fait tourner le second élément de mât autour de son axe longitudinal (21), par rapport au premier élément de mât (12).

2. Equipement de forage pour roche selon la revendication 1, caractérisé en ce que la poutre d'alimentation (15) est reliée en pivotement à une tête de mât (24) montée sur le second élément de mât (14) et présentant un axe (23) perpendiculaire à l'axe longitudinal (21) du second élément de mât (14)
3. Equipement de forage pour roche selon la revendication 2, caractérisé en ce que la tête de mât (24) comprend un moteur d'entraînement en rotation (22) permettant de faire tourner la tête de mât autour de son axe (23).

25

30

35

40

45

50

55



